

Aug 4 1969



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
GEORGE C. MARSHALL SPACE FLIGHT CENTER
MARSHALL SPACE FLIGHT CENTER, ALABAMA 35812

81 9/23 7/29 5/29/22 2563
Shaw
Rifet
8/9/22

REPLY TO
ATTN OF:

PM-EP-F/H-69-163M

SEP 19 1969

TO Dr. von Braun, DIR B 9/22

FROM Manager, Engine Program Office, PM-EP-MGR

SUBJECT Brown Notes of 8/4/69 Regarding Planned F-1
Engine Refurbishment Program

Reference note on Brown Notes 8/4/69^{attached} requesting synopsis on planned engine refurbishment program for five F-1 engines initially installed on S-1C-11. All five engines were removed from the stage and have or will be returned to Canoga Park, California. In order to meet The Boeing Company stage build schedule requirements an alternate set of engines will be allocated to the S-1C-11 stage. The engines originally on S-1C-11 stage will be reallocated.

The current engine refurbishment plan (see enclosure) is to have Rocketdyne subject these engines to a thorough electrical and mechanical type checkout to assess the damage incurred on S-1C-11 from fire, high level pressure surges, subsequent spillage of a large quantity of LOX on the engine intermixed with firex water deluge over about a one hour period. Since engine F-6045 was exposed to the more severe conditions Rocketdyne will perform a major disassembly and inspection on this engine. The extent of overhaul and refurbishment effort required will be based upon the results of the inspection of these engines and upon future program needs.

It is currently planned that one engine will be refurbished and allocated to S-1C-15 and two engines will be refurbished as flight spares. The remaining two engines can either be overhauled and put into the current 15 vehicle program, or if not required, rebuilt at very little additional cost to the follow-on (AS-516) configuration. The number of spare engines supporting vehicles AS-507 through AS-515 will be reduced to a minimum. ✓



Acceptance hot firing testing required on these engines will be dependent upon the inspection results, repairs required, and final allocation of each individual engine. Since spare engines may be installed at KSC without benefit of stage static test and with at least two engines of unknown quality being returned as spare engines, a minimum of one 40 second acceptance test is considered prudent. ✓

Due to the current manpower reductions at Rocketdyne there will be a relatively small crew available to perform the inspection, refurbishment, and test activities. These activities have been thoroughly integrated with the production program to allow a level of effort consistent with the reductions. The refurbishment schedule also permits the retention of minimum critical manufacturing skills, but precludes rehiring or buildup in excess of the foreseeable requirements over the next two years.

As of this date engine F-6045 has been completely disassembled and the components have been sent to the various departments for analysis. To date two electrical harnesses have been found unsatisfactory for flight.

A. J. Burks
for William D. Brown








Enc.

As Stated

cc:

PM-DIR, Mr. James

DISPOSITION OF F-1 ENGINES REMOVED FROM S-IC-II

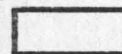
ENGINE NO.		1969					1970												1971					
		A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J
S-IC-15	6060																							
SPARES	6049																							
	6045																							
REBUILD DECISIONS DEFERRED	6070																							
	6072																							



INSPECTION



REFURBISH



HOT FIRE



2nd E&M



DELIVER ENGINE

1.0.7

NOTES 8-4-69 BROWN

8/4/69

3 8/9

F-1 ENGINE - The five F-1 engines initially installed on S-1C-11 and the F-1 flight spare for S-1C-5 (total of six) are scheduled for shipment from MAF to Canoga Park in August. Engines F-6045 and F-6070 are expected to depart MAF for Canoga by truck on August 5 and 7, respectively. Plans are being made to send the remaining four engines on the Point Barrow, which will be leaving the latter part of September. These shipping schedules are consistent with the currently planned engine refurbishment program which will support the redesigned vehicle schedule proposed by Boeing. Seven engine skirts will also be sent to the West Coast on the Point Barrow. ✓

(five days)

B.B.

Please send me a 2-page synopsis on this plan B

Action has been taken by LVGSE and KSC to modify the S-1C Hydraulic Supply and Checkout Unit to reduce the pressure transients which have unseated the Main Lox and Fuel Valves. Modification of the units will be effective for AS-507 and subs. Boeing ECP 350 (Schedule II) has been approved and verbal information has been received that installation is complete. ✓

J-2S ENGINE - A three test "air-on" was conducted at AEDC July 29, 1969. The first test was terminated prematurely after 3.2 seconds as a result of an erroneous tap-off temperature. The second test appeared satisfactory but the third was unusual in that chamber pressure decayed about 57 psia over 8 seconds, suddenly spiked below 100 psia, then climbed back to approximately 195 psia only to decay another 5 psia until cutoff 7 seconds later. Another air-on period will be delayed until this anomaly can be understood. ✓

11:30, Sept. 16
12:00 Oct. 3

Mr. Foster,

Bonnie,
when can we schedule
this? 4/8 Gene

We have (or had) a system where Clyde Hightower would notify Walt Weisman when ~~an~~ ^{an} employee received his PhD, Weisman would prepare a short note from Dr. von Braun to the employee and present it to him with maybe Col. Mohlere and his supervisor or lab director present. Dr. von Braun would take that opportunity to tell the employee what MSFC was now expecting from him.

There have not been any letters written since June (Mr. Hightower's workload). We owe the following people congrats:

- ~~OK George Fichtl, Aero 3-316~~ ^{return from Europe Oct.}
- OK John Admirer, Astronautics ~~3-396~~ ^{AL til 9-22}
- OK Richard Camble, Astrionics
- OK Bill McKinney, Astronautics 3-1563
- OK Eugene Worley, Aero
- OK Daniel D. Gregorius, Aero
- OK Ferrol W. Little, astr.

Letters are now being prepared for these. Do you think Dr. von Braun would see them all at the same time?

nancy
8-29-69

Yes.
a little ceremony with D. VB
would be appropriate. Perhaps
~~we could invite them all to a~~
~~staff luncheon one day? - Remind me~~
~~to discuss at an 8:30 mtg. JK 9/1~~

ROUTING SLIP

MAIL CODE	NAME	ACTION
		APPROVAL
		CALL ME
<u>DIR</u>	<u>Mr. J. Foster</u>	CONCURRENCE
		FILE
		INFORMATION
		INVESTIGATE AND ADVISE
		NOTE AND FORWARD
		NOTE AND RETURN
		PER REQUEST
		PER TELEPHONE CONVERSATION
		RECOMMENDATION
		SEE ME
		SIGNATURE

Worley?

Please arrange

P.S. are there another

new PhD's that we

could also let Dr. von Braun talk to briefly?

Mr. Foster,

Dr. Eugene Worley of this laboratory recently received his Ph. D. degree (see Weekly note, attached). Do you think Dr. von Braun would like to have him come to his office to shake his hand?



J. v. Puttkamer
 Jesco von Puttkamer
 Special Assistant to Director
 Aero-Astroynamics Laboratory

MAIL CODE	NAME	TEL. NO.	DATE
S&E-AERO-DIR	J. von Puttkamer	3-3016	8/27/69

File

NOTES 8/11/69 GEISSLER

1. NOMINATIONS FOR RESEARCH ADVISORY COMMITTEES: We have received a request for nominations of Aero-Astroynamics Laboratory representatives on the OART Research Advisory Committees for Aeronautics and for Basic Research. Our nominees are, for the former, Mr. H. G. Struck to serve on the Subcommittee on Aircraft Aerodynamics and Mr. Mario Rheinfurth for the Subcommittee on Aircraft Flight Dynamics; for the latter, Mr. W. K. Dahm as a member of the Subcommittee on Fluid Mechanics.
2. S-II STAGE REENTRY FROM DRY OWS: Questions seem to be arising about the probable sizes of pieces resulting from S-II reentry breakup after Saturn V workshop insertion. A suggestion is made in this laboratory to investigate the feasibility of tracking and filming a mainstream Saturn/Apollo vehicle S-II stage reentering and breaking up via aircraft and/or ship. Data about debris size could be obtained which may be applicable to this problem.
3. EDUCATIONAL ACCOMPLISHMENT: Mr. Eugene Worley of our Dynamics and Control Division has completed all requirements for his Ph. D. degree at the University of Alabama, majoring in Engineering Mechanics. Mr. Worley's thesis is entitled "The Dynamic Response of Beams of Time Variable Length." The degree will be conferred at graduation exercises August 22, 1969.

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NOTES 8-11-69 BALCH

B
8/18

S-IC-12: Stage processing is approximately two days behind schedule as a result of late submittal of procedures for NASA approval. During performance of GN₂ Purge and Control Pressure System Checkout, inadvertent operation of the wrong control by a TCC panel operator caused the GN₂ pressure to be trapped and then released suddenly through a flex hose a mechanic was holding. The mechanic managed to retain control of the whipping hose and to prevent any personnel injury or hardware damage. During stage checkout, the following discrepancies were found in the Engine Stop Backup Hydraulic Control System: several "O" rings were missing, involving all engines; one "O" ring was damaged (engine nr. 3); stop backup solenoids were installed backwards (engines nr. 3, 4, and 5); and out of a total of 40 "B" nut line connectors, 38 had unauthorized flare savers (crush washers) installed (all engines). These discrepancies originated at Michoud.

J.B.
Another sign that adherence to procedure is being taken. Contractors personnel turnover.

LP James I guess a really harsh letter to BOMEX/Michoud is due! How can it be done?

S-II-9: Stage was removed from the A-1 Test Stand on 8/7/69, one day sooner than previously scheduled, and is now installed in the horizontal position in the S-II Stage Checkout and Storage Building for LH₂ tank inspection.

S-II-10: Stage is in the A-2 Test Stand undergoing prestatic checkout in preparation for cryogenic proof pressure test on 8/15/69.

Testing as long as this kind of workman ship & quality prevails!

S-II Stage Storage Dolly Project: The first completed S-II Stage storage dolly was shipped from MTF on 8/5/69 and departed Michoud on 8/8/69 for Seal Beach where it will undergo final acceptance testing.

BOMEX: Field operations roll-up has been completed and final shipment of data has been received at MTF. Digitizing of data is underway.

GE Service Contract: Authorization has been received to negotiate with General Electric for an extension of the present contract for the period 10/1/69 through 6/30/70, and a Request for Proposal for the contract extension is being released this week.

B 8/12

Visit by LaRC Representative

Mr. Paul R. Hill from Langley visited the Center last Thursday, July 31. Mr. Hill and Mr. Mattson have been designated by Mr. Cortright to be the Langley interfaces to MSFC for the Phase B Space Station Definition Study. We briefed Mr. Hill on our management approach for the Space Station activity and had a brief exchange of ideas concerning some of the aspects of the program. We also arranged a tour through several of the laboratories to acquaint Mr. Hill with specific areas of Center capability. ✓

Similar tours will be offered for representatives of other Centers participating in the Space Station Program. ✓

Rotating Environments

Drs. Miller and Cramer of Naval Aerospace Medical Institute (NAMI) will visit MSFC on August 12, 1969, for briefings on the Space Station Program and discussions related to partial gravity and centrifuge experiments. Adjustments to the NAMI orientation course for MSFC personnel will also be discussed.

The next session at Pensacola will be held August 19 and 20. A one-day orientation has been arranged for Dr. Rees on August 26. Dr. Miller will be his instructor. ✓

Dr. Graybiel's (of NAMI) visit has been scheduled for October 17, 1969. His lecture on rotating environments will cover a full morning session. Questions and discussions will follow during that afternoon. ✓

Jet Propulsion Laboratory (JPL) Visit

Several members of the Jet Propulsion Laboratory (JPL) will be at MSFC on August 12 to discuss their work on remotely controlled roving vehicles with the Lunar Mobility Task Team. JPL (Dr. Homer Stewart) has agreed to help in working out a program for a remotely controlled lunar rover. ✓

B2/13

AAP EXECUTIVES MEETING: Mr. Schneider is conducting an AAP Executives Mtg. at Michoud today w/Hq., MSC, KSC, and MSFC participating. The purpose of this meeting is to review the status of aspects of the program including baseline, key documentation, contracting, financial and manpower, etc. ✓

PROGRAM SPECIFICATION: The AAP Director held a Level I CCB meeting on 8/4/69, for the purpose of baselining the Program Spec. This document includes the launch and orbit configuration of the dry workshop as MSFC presented to the Management Council on 7/8. ✓

MSFC comments were well received and generally accepted, with some taken under consideration. Hq. expects to have this document issued in about 10 days. ✓

CLUSTER REQUIREMENTS SPECIFICATION: The dry workshop version of this document was presented to the Level II CCB meeting on 8/8. Significant baseline items, areas requiring additional work, and other details were presented at the meeting. ✓

THERMAL AND ENVIRONMENTAL CONTROL SYSTEM REVIEW: In preparation for the AAP Level II CCB and the CSM Baseline ECS/TCS meeting scheduled for 8/8-12/69, respectively, a technical review of the redefined AAP Cluster Thermal and Environmental Control System was held at MSFC on 8/6-7/69. Representatives from MSC, S&E, PM, Bellcomm and MSFC support contractors provided an interchange of technical information vital to the adequacy of the AAP Cluster Requirements Specification. The theme of the meeting was minimum changes required to convert from the wet to dry workshop. ✓

No major changes to the present TCS/ECS are foreseen, however, revised timelines and power profiles and the addition of a stove, refrigerator, OWS lights to meet MSC criteria, etc. may severely impact the capability of these systems. ✓

ATM P. I. BRIEFING: The ATM Principal Investigators and key experiment hardware contractors met at NASA Hq. on 8/4/69, and were briefed by Mr. Schneider on (1) the logic behind the recent change to the dry workshop configuration and (2) preliminary design details of the new configuration. The P. I. 's were told to continue with their current baselined experiment hardware since strong attempts are going to be made by MSFC to maintain the existing interfaces and environments. The P. I. 's were most concerned about becoming involved in future timing effort for the extended mission duration and the lack of a TV downlink during the unmanned portions of the mission. ✓

L.B.
Is Schneider
opposed
to the TV downlink?
B

B 8/10

NOTES 8-11-69 BROWN

GENERAL - On August 6, 1969, Rocketdyne personnel presented at MSFC a summary of the Rocketdyne approach to obtaining approximately a 50% reduction in the fly-away costs of the F-1 and J-2 engines. The presentation was made to the Engine Program Office and to representatives of the various Center laboratories and project management offices interested in the Saturn V follow-on production.

This presentation and the concurrent delivery of detailed bid packages was the culmination of an in-depth study undertaken by Rocketdyne as requested in letter dated May 5, 1969, from the Engine Program Office Manager to President, Rocketdyne. Many of the proposed changes in method of operation at Rocketdyne will require a diligent effort by both contractor and Government team members to fully implement. However, to achieve significant and early savings to the Government, immediate implementation of some of the excellent suggestions is being considered for incorporation in current engine contracts. The detailed bid packages are being reviewed and operational concepts coordinated for timely preparation of RFQ's. Completion of these reviews and presentation of a formal RFQ to the contractor is scheduled for mid-September and is dependent upon Headquarters approval of the Procurement Plan submitted on July 18, 1969. Headquarters personnel indicate that the Procurement Plan has cleared all staff offices and will be ready for signature by September 1, 1969. The Project Approval Document (PAD) has not yet been signed by the Administrator. ✓

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1. ASTRONOMY PAYLOADS FOR SECOND WORKSHOP MISSION: In my Notes of 7-28-69, I mentioned that Dr. Mueller was enthusiastic about the possibility of incorporating a 60" stellar telescope on the second workshop mission and that this proposal had been discussed with Dr. Goldberg, Dr. Whipple and others at the recent STAC meeting. You commented on these Notes as follows: "I hope he doesn't mean a telescope permanently attached to the DWS like the ATM. What we should have for stellar work is the 'plug in, but free-floating type.' " In connection with your question, we contacted Mr. George Anderson of Bellcomm, who had made the presentation on MSE astronomy planning for Dr. Mueller at the STAC meeting. Mr. Anderson indicated that Dr. Mueller was considering a permanently attached stellar telescope like ATM. We certainly agree with your comment that, for the stellar case, a detachable module would appear to be most desirable. However, this is not to say that a permanently attached stellar telescope would not be feasible or usable.

I would like to mention again that an ATM-B solar payload, which would make maximum practical use of ATM-A systems and hardware, but which would incorporate new experiments, seems to be a very logical candidate for DWS #2. (One-meter class, diffraction limited, stellar telescopes are being planned for OAO in the 1973-1975 time frame.)

We will continue to consider both the stellar and the solar payload possibilities for DWS #2. However, we have not yet had time to study the stellar payload possibility in any depth. We are communicating with Mr. Lee Belew, Mr. Waite and others in PM in connection with the above.

2. SUMMER STUDY: The Auburn-ASEE summer design effort has involved a study of an Earth Orbital Space Technology and Applications Research Laboratory. We have supported and followed this effort in Program Development. Various persons throughout the Center have provided assistance in specific areas. The faculty study group, who have tackled their two-months' study task with great interest and enthusiasm, will make a final presentation on August 20. Invitations to this briefing will be sent from Col. Mohlere's Office.

L.D.
I'm violently
opposed to
that! I'm
sure (and
glad to know)
that Goldberg's
Astronomy
Board
likewise wants
a separate,
free-floating
plug-in
stellar telescope
B

So is a coal-fired steam
airplane!
B

B 8/18

BOB STUDY OF LUNAR EXPLORATION

BOB has requested data from NASA pertaining to alternate approaches to lunar exploration. Included in this study was the request for launch vehicle and spacecraft production information. The preparation of this data by MSF is now completed and will be reviewed by Dr. Mueller and Bill Lilly on Monday, August 11. ✓

MSFC supplied data on two of the six significant items in the study. The Saturn V production cost (Item 2) was supplied by PM and Item 4 was prepared by Jack Stucker of this office. The six significant items were:

1. A description of the Institutional Base Concept. ✓
2. Saturn V and CSM production costs at 1, 2, 3, and 4 deliveries per year; costs for a minimum sustaining level (a period of no production but with capability to resume production at a later time) and a Post Production Support (a period of no production or anticipated production - support of launches only). ✓
3. Three lunar exploration schedule options. ✓
4. Rationale for the effect on cost of various rates of production. ✓
5. The economic impact on the various geographical areas concerned with the CSM and Saturn V if production was terminated. ✓
6. An approach to rapidly increase the production rate from 2 to 3 per year. This involves the minimizing of the production lead time once the "go-ahead" is given. This could be accomplished by pre-buying of materials and partial assembly of a vehicle. ✓

Since this will be the first time BOB has officially received the Institutional Base Concept, we will follow closely their reaction. ✓

ADP MANAGEMENT

In an August 6 meeting of the ADP Management Decision Group, a decision was made to move all commercial applications to the 1108 EXEC VIII by October 31. Scientific work will be moved from the EXEC VIII to the GSA 7094 and to Slidell as required to make time for commercial work. The GSA 7094 and Slidell computers are available at a very low cost rate compared to computer time now being purchased at University Park for commercial work. ✓

NOTES 8/11/69 GEISSLER

B
8/18

1. NOMINATIONS FOR RESEARCH ADVISORY COMMITTEES: We have received a request for nominations of Aero-Astroynamics Laboratory representatives on the OART Research Advisory Committees for Aeronautics and for Basic Research. Our nominees are, for the former, Mr. H. G. Struck to serve on the Subcommittee on Aircraft Aerodynamics and Mr. Mario Rheinfurth for the Subcommittee on Aircraft Flight Dynamics; for the latter, Mr. W. K. Dahm as a member of the Subcommittee on Fluid Mechanics.
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B 8/18

SATURN:

1. Saturn IB Breadboard Operations: In Notes 7/28/69 JAMES, it was reported that the IB Breadboard was being prepared for complete shutdown by August 29, 1969. This is being accomplished with the exception of an AGCS RCA 110A computer and the Sanders Display equipment which is needed by the Astionics Laboratory Computer Division for failure analysis and other testing on Sanders equipment. Arrangements have been made for three Chrysler people to maintain this equipment. We expect to realize an approximate savings of \$600,000 during FY 1970 by closing down the remaining Saturn IB Breadboard operations. ✓
2. Reference your question on the S-II common bulkhead test deletion, Heimburg Notes dated 7/28/69 (cy attached): North American had reported to S&E-ASTN that no savings would result from deletion of the common bulkhead hydrostatic test and incorporation of the test into the pneumo-static test. Actually, this is not the case. The break-even point is reached after the first test, which amortizes the cost of the documentation and planning. After that, we expect a significant cost savings. NR is preparing a cost savings estimate, and we expect an ECP soon. ✓
3. Dry Workshop: Use of the Saturn V dry workshop relieves the critical six to seven second launch window for the Saturn IB launches which prevailed for the wet workshop launches. The launch window for the Saturn IB is now about 25 minutes duration. ✓ This will allow at least one recycle back to J-2 engine chilldown for a last-minute redline problem, rather than a scrub. ✓

LRV:

The lunar surface definition and Rover design requirements are being reassessed as the result of the Apollo 11 mission findings as to a large number of surface obstacles and LM payload capability. We feel the requirement for a Rover remains unchanged by Apollo 11 experience and are proceeding with a Rover contractor selection on our present schedule. Early discussions with MSC, Headquarters, and proposing contractors indicate a good understanding of the effort required to generate good decisions on Rover and a willingness to cooperate fully as we proceed. The Rover Vehicle Project is based on early confirmation that a state-of-the-art design will meet all requirements and can be manufactured and tested without an extensive development program. Go-no go decisions must be made at two milestone dates -- early October prior to turning the contractor on by letter contract, and mid-December prior to definitive contract. ✓

NOTES 8-11-69 GOERNER

B 8/18

1975 SPACE STATION SYSTEM WEIGHTS

A technical summary briefing was given to S&E organizational elements on the Preliminary Design Office study results of the 1975 Space Station. The current Space Station common module weight totaled 146,000 pounds, which is significantly larger than the 120,000 pounds of design weight established by NASA Headquarters. An additional weight of approximately 30,000 pounds would be required for the artificial g operational mode and would raise the total module weight to 176,000 pounds. Analysis is underway to assess the study guidelines and design assumptions upon which the detailed weights are based in an attempt to identify possible weight reductions and weight sensitivities. ✓

ENGINES - LOW COST FOLLOW-ON: The summary presentation on Saturn V low cost follow-on for F-1 and J-2 engines was made by Rocketdyne August 6, 1969. The goal which had been set for Rocketdyne was a 50 percent reduction in overall cost without loss of reliability. It was substantiated that the first portion of the goal could be met; however, no information was presented to show that reliability was or was not affected. Proposed fabrication hours were reduced 23.2 percent on the F-1 program and 7.8 percent on the J-2, while test and quality control hours were reduced approximately 52.6 percent on the F-1 and 41.4 percent on the J-2 programs respectively. From this data, it is apparent that we will have to take a hard look for effects on reliability. A meeting has been scheduled at Canoga Park August 13, 1969, to discuss the F-1 low cost configuration and other low cost operational approaches.

B_{2/18}

1. Comments to Downey's 7/28/69 NOTES, Item 1, "Astronomy Mission Planning":
In comparing the free floating mode and the free magnetic bearing suspension and orientation mode, the latter should not be neglected; a thorough comparison seems very advisable. Under a NASA Hq/OSSA contract (monitored by Princeton University), Perkin-Elmer has accomplished remarkable magnetic bearing development work. Such a system would be, in my opinion, by far less complex and therefore more reliable and easier to operate than a free-floating telescope system which requires, besides its own expensive remote control attitude control system, station keeping and automatic docking. ✓

2. Engine Requirements for Space Shuttle: We realize that Dr. Mueller's aim for a self-contained engine package is a very desirable goal. However, if this goal includes that the engine should have its own power supply, sequencer and telemetry subsystems, it becomes doubtful that an optimum system solution can be found. We recommend strongly that the first contract include a trade-off study in this respect, to be carried out by the engine as well as the vehicle contractor. ✓

G.H.
 Please
 send me
 some
 dope on
 this.
 What is Jim
 Downey's
 position
 this?
 B

LRV BEARINGS, GEARS AND DRIVE MOTOR INVESTIGATIONS LRV drive apparatus is presently being assembled to provide testing capability under precise simulated lunar temperature and vacuum conditions. Although we have much statistical thermal vacuum data on motor, brush, bearing and lubricant applications, we are convinced that "in situ" testing is the only way to insure a high reliability system. We believe we have proven components to provide the building blocks from which a completely satisfactory drive system can be developed - within the short development lead time currently permitted by the schedule. ✓

S-1C 4.35 G CUTOFF As a result of the "Extended LM" planned for use on AS-511 and subs, MSFC has been asked to evaluate the Saturn V for a 108K payload. One approach considered by the Center is to reincorporate the S-1C center engine standpipe and go to a 4.35 G cutoff. Since an end-boost condition in excess of 4.00 G will have structural impact, the required modifications are being assessed. ✓

S-IVB-506 LOX TANK ULLAGE PRESSURE COLLAPSE Additional MDAC analysis confirms the previous assumption that added heat transfer across the S-IVB common bulkhead due to bulkhead pressurization with Argon contributed mainly to the ullage pressure decay subsequent to first burn cutoff rather than a helium leak which had to be at least 10 scfm. We agree with contractor's position that remedial action is not necessary for future flights as the current makeup system is more than adequate and the H₂O₂ burner system performed excellent. ✓

LIFE SUPPORT EXPENDABLES FOR SATURN V WORKSHOP (SWWS) A comparison of ambient high pressure gas and supercritical cryogen storage has been completed. Development status and capability of potential suppliers were evaluated based on available use rates and timelines. The applicable advantages of cryogen storage are lower storage volume and weight. Disadvantages are relatively higher development cost and a potential sensitivity to mission timelines. The high pressure gas system weight and volume can be accommodated in the SWWS and is, therefore, recommended. However, we believe that cryogen storage system development is essential to space station design due to its weight and volume advantage and potential resupply capability. ✓

ILRV THERMAL PROTECTION SYSTEM (TPS) A review with the ILRV contractors has resulted in general agreement that the ablation TPS is costly to refurbish and would impact vehicle turnaround time. Various alternative TPS types, either radiation or insulation, were also proposed. Lockheed proposed LI-15 low density insulation as a candidate. In summary, it appears that every radiation concept proposed will require extensive development. ✓

NOTES 8-11-69 Heller

B 8/18

1. APOLLO 11: I reported in the previous Notes about Dr. Costes' participation in the lunar soil studies at the LRL in Houston. He participated in the scientific and other debriefings of the astronauts on August 6. He has been invited, together with all members of his scientific team, to the astronaut luncheon in Houston on August 12. ✓

2. VISITOR FROM OVERSEAS: Dr. Igenbergs from Munich, Germany, is on a tour of various NASA Centers and visited SSL last week. He is Harry Ruppe's deputy at the Space Institute in Munich. He has applied for an NAS research associateship and is going to ask for a research assignment in plasma physics in SSL. He would be an excellent addition to Bob Naumann's research team on the plasma gun for micrometeoroid particle simulation and meteoroid penetration and shielding studies. ✓

3. ATM-B STUDIES: Reference is made to your question to my Notes of 7-28-69, attached. There is no discrepancy between Downey's and my Notes. I discussed this with Jim Downey; he just happened to emphasize in his Notes the stellar telescope. Program Development is studying both the ATM-B payload with the three experiments as described plus a Hydrogen-Alpha close to that of ATM-A, and the large diffraction limited stellar telescope. I listened on August 7 to a dry run by members of PD for Dr. Lucas of the PD studies in preparation for the Naugle visit. The story on the ATM-B in the second Dry Workshop sounded good to me. It is quite obvious that PD looks at a great number of possible astronomy payloads. SSL is participating to a varying degree in the ATM-B, the high energy and X-ray astronomy, the UV astronomy and the gyroscopic relativity experiments. SSL concentrates on support of individual experiments and the technology and physics connected with them. ✓

NOTES 08-11-69 HOELZER

B 8/18

1. COMPUTATION SUPPORT FOR PROGRAM DEVELOPMENT: At the ADP Management Decision Group Meeting on August 6, 1969, the Computation Laboratory was authorized to procure two analog computers to be located in Dr. Lucas' area and to be used primarily on his advanced studies work. We will obtain these machines on a lease basis because of lack of funds to purchase them. These machines will be relatively small - about 150 amplifiers each. They will be similar to the EAI 680 type computers.

2. CONVERSION TO THE 1108 EXECUTIVE VIII SYSTEM: As a result of a review of the status of conversion of jobs to the 1108 EXEC VIII system, and with the concurrence of the ADP Management Decision Group, a change of emphasis in conversion is planned.

Approximately two-thirds of MSFC's business and management type applications are still being run on the University of Alabama Huntsville 1108 EXEC II system and the remaining second generation IBM 7010. These machine hours are much more expensive than 7094 machine time at the downtown Federal Data Processing Center. Since the Laboratory EXEC VIII system appears not yet ready to handle the present MSFC computing workload, we need to shift overloads to the least expensive equipment. The 7094's offer the best immediate solution and are better adapted to scientific work. We plan to shift as much scientific work to the 7094's as is necessary to complete the conversion of management-type applications to the EXEC VIII system. Hopefully, we will find ways of increasing EXEC VIII capacity so that this does not become a permanent arrangement.

NOTES 8/11/69 JOHNSON

B 8/18

Space Processing for Dry-Launched Workshop II - Mr. Bill Armstrong, MTX, requested this office to submit a set of space processing experiments to fly on a second dry-launched workshop. We have asked ME, SSL and ASTN laboratories to submit experiments which in the main will utilize a processing chamber that ME has been designing. We plan to make the submittal to MTX about mid September. ✓

Status of SRT Programs - The majority of the FY-70 Research and Technology Objective Plans (RTOP'S) have received technical approval by Headquarters. We are awaiting word on those pertaining to Communications and Propulsion. Initiation of planned procurement actions for work related to the Shuttle is being delayed because of a "Hold Order" imposed by Del Tischler in his capacity as Chairman, Space Shuttle Technology Steering Group. I will meet with Tischler and others August 12 to explore ways of minimizing this delay. ✓

NOTES 8/11/69 MOHLERE

B8/18

Nothing of special significance.

DRY WORKSHOP ATTITUDE CONTROL SYSTEM: Since the dry workshop mission requires continuous attitude control by the CMG's during the manned and unmanned phases, two major changes to the wet workshop CMG attitude control system had to be incorporated. To eliminate single point failures, one of the changes was to make the digital computer redundant. The digital computer is mission critical on the dry workshop mission since it is required to perform the automatic gravity gradient desaturation calculations and maneuvers and is also used in the stabilization loop during the CSM docking. For the wet workshop the CMG control system was designed for the manned phase and the astronauts were available to back up a digital computer failure. The second major change was to incorporate automatic switching of redundant hardware (rate gyros, sun sensors, etc.) during the unmanned phases. Implementation of automatic switching is more easily accomplished and less costly with the digital computer as compared to the analog computer. ✓

With the above changes to the CMG control system the next logical step was to consider the elimination of the CMG analog control computer and use the digital computer for attitude control. Eliminating the analog computers and using redundant digital computers for attitude control result in a slightly higher reliability prediction and require less effort for test and checkout. The delta cost for the additional digital computer capability is approximately \$6 million over the ATM control system for the wet workshop. However, some costs may be recovered from the analog computer contract and since the separate control system (WACS) for the wet workshop is eliminated, there is an overall cost reduction. ✓

Consideration has also been given to use digital control for the fine pointing control of the ATM experiments. However, capacity of the computer may be too marginal for this function and redundant analog circuitry may prove to be the desirable approach in the fine pointing control system. A firm recommendation on all aspects of the dry workshop computer subsystem will be made shortly. ✓

NOTES 8-11-69 MURPHY

B 8/18

Nothing of significance to report.

NOTES 8-11-69 SIEBEL

B 8/18

1. Neutral Buoyancy: The ATM EVA film retrieval system was evaluated on August 6 and 7 by Astronauts Garriott, Cunningham, and Schweickart. The debriefing was held at the Neutral Buoyancy Simulator, and general comments concerning hardware and procedural changes are presently being evaluated. ✓

2. OWS/Mockup: Program Management has requested that we prepare the mockup for a review of the Habitability Support System (HSS) on August 26, 1969. The HSS includes the waste and food management areas and the two sleep compartments. The work includes repairing and reinstalling the walls, ceiling and lights in the crew quarters, painting to the latest paint patterns and installing the "furniture" as furnished by MDAC - WD and which should be shipped to us by August 8. For this review the mockup will remain in Building 4755. ✓

NOTES 8/11/69 SPEER

B 8/18

1. AS-506/S-IC Entry: Re your question on launch hazards to ships (Notes 7/28/69 Geissler). Under present policy the range takes the following steps: (1) announcement of launch in local seaports; (2) on launch day the U.S. Coast Guard enforces evacuation inside range safety limits out to 3 nm; (3) 90 min. prior to launch all ships within 20 nm of the Cape are informed on maritime frequencies. Therefore, no specific assurance is obtained that all potential impact areas (variable azimuth) are free of ships. The German freighter, VEGESACK observed the S-IC reentry, and one 30 cm piece of debris landed on deck; no damage. It is expected that the piece will be returned to the U.S. More caution is exercised with aircraft. At least 2 weeks prior to launch Air Traffic Control is notified. All air traffic is routed outside the flight area for an adequate period of time. ✓

2. LIEF Operations: After the successful lunar landing and unsuccessful consonance with cost reduction efforts we have carefully evaluated the continued need for all elements of our LIEF facilities. In a series of inhouse meetings with Dr. Hoelzer and Ed Hildreth we have reached agreement that significant cost savings can be achieved in reducing or modifying our voice/data communication lines and in the number of contractor support. I am preparing a proposal which will retain our basic capability and responsibility to support the operations centers and reduce cost to an acceptable level. A presentation to Gen. Stevenson is planned for September 18. ✓

3. Apollo Photography: This is in response to Dr. Rees' question during the Board Meeting on 8/8/69: There are two classes of photo items we are requesting for each flight: (1) engineering film which is delivered to ASTN (J. Earle), and (2) PAO items which go to the Photo Lab. All items are requested through this office via the PSRD (Program Support Requirement Document). We receive photo items from KSC, MSC and Headquarters. In general, this system works. However, on a flight like Apollo 11 the question of priority becomes more critical and it happened that several newspapers had excellent coverage before we received our copies. We are taking a close look at this and will propose corrective action if necessary. ✓

B 8/18

VISITORS

Messrs. G. Gaffney and M. Pagliuso and Major Manahan of NASA Headquarters Facilities Office, Plant Engineering Division; and Mr. A. Daly, MSFC, met with personnel of MAF Manager's Office and Facilities Office on Tuesday, August 5. This was NASA Headquarter's annual visit to review the Facilities function at MAF. Specific emphasis was placed on maintenance, repairs, and operations of this facility. ✓

NOTES 8-11-69 STUHLINGER

B 8/18

1. ASTRONAUT DEBRIEFING: On 8/6, I attended photography and science debriefings by the astronauts, and a preliminary report from lunar sample analyses. A detailed report was distributed to members of MSFC. Further copies can be obtained through telephone 453-3033. ✓

Mr. Foster, DIR

September 24, 1969

Subject: NOTES 8/18/69 HAEUSSERMANN


In connection with the attached NOTES, I believe a little background would be helpful. Initially during the development of the reorganization within S&E, it was estimated that a total strength of 120 would be required for CSE. This was 65 above the then current strength (55) of Ludie Richard's Systems Engineering Office which included the Projects Support Group whose functions were assigned to Mr. Kroeger's Products Office.

Since that time as specific functions were clarified or undertaken, there has been a tendency on the part of CSE to add to the 120 without consideration of the requirements that could be covered by the 120, so the original number has gradually built up by them to 154 which has not been concurred in or authorized by S&E pending a determination of S&E's ceiling for the balance of this fiscal year by reason of a Headquarters established ceiling on MSFC and the final decision of PD's strength as it may affect S&E.

On the 12 current announcements within S&E, 4 have been committed to CSE and 8 are in the process of being adjudicated based on impact statements of the laboratories involved. This brings their permanently assigned, detailed, and announcement selection strength to 126. The balance of 8 will be worked out, making a total strength of 134 or 14 above the original estimate of 120. As we are able to do so, we will continue the YOC and try to add some Co-Op engineering students.

By reason of the problem set forth in Mr. Weidner's recent memo and the supporting memo of Dr. Geissler, there will be no more advertising within S&E for any further strength above the 134. Any further increase to CSE's personnel strength will be decided on a case-by-case basis so we can arrange to make available qualified personnel without losing further key critical personnel from our major design laboratories. CSE has also been advised that before we consider any further increases, we want to review the organization's functions and requirements for personnel on a basis similar to the prior manpower reviews within S&E.

It has not previously been possible to establish a firm ceiling for CSE to recruit into pending clarification of responsibilities of CSE with respect to the Products Office and the internal operating mode within CSE and with PM, which firmed up this week. With this, we can now arrive at a realistic personnel ceiling for CSE which is based upon requirements.


R. W. Cook

1 Enc:

Subject NOTES



NOTES 8-18-69 BALCH

B5/22

No submission this week.

B
8/22

SPACE STATION

Contract Status: The Phase B Space Station contract was submitted to the McDonnell Douglas Corporation (MDAC) for review and execution on Wednesday, August 13. We expect to have a signed contractual document by August 18 for final processing in NASA Headquarters.

MDAC personnel were briefed on a possible MARS Mission in order to appraise the possible impact that incorporation of these requirements into the present Work Statement would have on the study.

Communications: On August 12, Tomm Barr gave the Electrical Engineering Department of Auburn University a presentation on Space Station Communications. The objective was to give a preview of communications technology requirements and to generate an interest in research and development work for the Space Station.

LUNAR MOBILITY

Lunar Exploration Vehicle: We have had preliminary discussions with Mr. Scherer's office on an approach to planning an earlier vehicle than the DLRV which would be available 1 year to 18 months after the manned LRV and about 1 year before the Dual Mode Roving Vehicle. Mr. Scherer's office is receptive to this approach and has asked us to continue to study this concept in view of pending configuration or redirection of the DLRV contractors. The proposed vehicle will be simpler and more economical than the currently envisioned dual mode vehicle but will retain some of the features, such as remote control from ground stations and simple science package.

Loop-Wheel Track Concept: Discussions of Lockheed's loop-wheel concept was received favorably in Headquarters last week. We plan to demonstrate and show a film at the staff luncheon on August 20, as requested by Mr. Shepherd. This concept offers promises for a remotely controlled vehicle due to its low center of gravity, high chassis clearance, good crevice crossing capability, and large footprint. If technical development problems of the track can be overcome, this concept will be a good contender for the LEV along with the six-wheel concept.

B 2/22

HABITABILITY SUPPORT SYSTEM PRELIMINARY DESIGN REVIEW:

The Habitability Support System Preliminary Design Review is scheduled for August 26. All MDA C mockup hardware has been received at MSFC except the waste collector and waste processor from Fairchild-Hiller. This hardware has been shipped and is due now. ✓

WORKSHOP COMMUNICATION SYSTEM: Sam Fordyce, Manager of Communication and Data Systems, AAP Headquarters, visited MDA C to discuss the feasibility of adding a communication antenna to the Workshop. This communication system would utilize the Intelset IV Communication Satellite. Hughes Aircraft Company will be conducting a four-months feasibility study for the antenna system. Presentation of this communication concept is expected to be presented before the Management Council in September. MDA C indicated that the addition of an antenna in the area where the J-2 Engine was located did appear to be feasible. ✓

AAP EXECUTIVE MEETING: An AAP Executive Meeting was held by Mr. Schneider with the three Centers and contractors at Michoud on August 11. Some of the more significant items from the meeting include:

1. The March '72 launch readiness date was reaffirmed. ✓
2. Program level requirements documentation has been baselined providing the common direction for all elements of the Program. ✓
3. Mr. Schneider plans a Program Review about the second week of September to review Program planning and baseline requirements/ configuration status. ✓
4. Dr. Paine has directed that the Program be renamed to "something like Apollo and Gemini." ✓

ATM EXPERIMENT POINTING SYSTEM: Perkin-Elmer delivered the vibration unit of the Experiment Pointing Control (EPC) and Roll Positioning Mechanism (RPM) on August 14, 1969. Delivery of the Dynamic Test Fixture and functional units is scheduled for later this month. ✓

CREW STATION REVIEW: The ATM Crew Station Review will be held at MSFC beginning August 19, 1969. In-depth MSC participation is expected. ✓

Di:ron Brown

NOTES 8-18-69 BROWN

B 8/22

F-1 ENGINE - Reference my notes of 6-30-69 concerning the ruptured thrust chamber tubes in F-1 engine F-6070 position 105, S-1C-11. Testing has been completed at Rocketdyne of a thrust chamber filled with RP-1 and subjected to rapid freezing and thawing cycles. These tests produced the fat and skinny tubes, plus the gate type ruptures discovered on engine F-6070 after the S-1C-11 incident. Concurrently, similar testing was conducted by S&E-ASTN with the same results. These tests confirmed the theory that tube deformation and ruptures were caused by cyclic spillage of LOX on the thrust chamber and thawing of the chamber by firex water. ✓

A thrust chamber external tube leak has been detected on engine 055 on S-1C-8. The leak will be investigated and repaired in accordance with established maintenance and repair procedures. Specialists from Rocketdyne Canoga Park will arrive at KSC today to accomplish this work. ✓

SPACE SHUTTLE ENGINE - Reference is made to interest expressed during the Space Shuttle review on 8-15-69 concerning the Shuttle engine development schedule. Attached is comparative engine information for the Shuttle and Saturn engines. From this comparison it can be seen that the Shuttle engine development assumes some "learning" from the Apollo program. In my opinion, the schedule is very tight but probably not impossible. Of course, the smaller the engine size, the more confidence we would have. ✓

1. GULF STREAM DRIFT MISSION: The Ben Franklin surfaced at 7:45 a.m. EDT on Thursday, August 14, after drifting in the Gulf Stream for 31 days and traveling 1200 miles. The crew is well. The mission was successfully completed. A coast guard cruiser transported Chet May and other crew members to Portland, Maine. They were then flown to the Grumman facility in Bethpage, New York. A debriefing of the crew is scheduled for August 18 and 19 at Grumman. A press conference is planned in Washington on August 20. Captain Slattery has been advised and he will attend the debriefing at Grumman and the press conference in Washington. Grumman is also planning a banquet and other festivities during the week of August 25. ✓

NASA persons, who to my knowledge plan to attend the debriefing on August 18 and 19, in addition to Captain Slattery, will be Mr. Funston of PD, Mr. Heckman and Mr. Schwinghamer of ASTN, Dr. De Lucchi of MSC, Mr. Markey of MSF, and Dr. Scow of LaRC. ✓

2. CARNEGIE-MELLON UNIVERSITY CONTRACT - "USES OF OUTER SPACE": You received a letter several months ago from Dr. Milton Shaw, Head of Department of Mechanical Engineering, Carnegie-Mellon University, regarding a proposal for students to make a study on space manufacturing techniques. Carnegie-Mellon subsequently broadened the scope of their initial letter proposal to you and submitted a formal, unsolicited proposal titled "Uses of Outer Space." In the most recent proposal, the students will study the possibilities of a wide variety of experimental activities in space with special emphasis on technological and application type experiments that will potentially provide direct benefits to mankind. A contract for approximately 12K has been negotiated with Carnegie-Mellon, and it is expected that the contract will be signed before the end of the month. We need to strengthen our foundation with respect to the many claims of the financial and other benefits that will accrue from the space applications and advanced technology experiment areas. This study may result in some good ideas and new concepts; the investment is quite modest. We have been coordinating with Col. Mohlere's Office in connection with implementation of this contract. ✓

B 8/22

FY-70 MANPOWER AND EXPENDITURE REDUCTIONS - NASA Headquarters has received a memorandum from BOB, dated August 7, 1969, which revised the NASA FY-70 civil service ceiling from 31,500 to 31,000, a reduction of 500 permanent positions. It is anticipated that the MSF share of this reduction will be around 250. A reclama is being prepared by NASA Headquarters to BOB which indicates that this reduction probably cannot be accomplished without a "RIF".

BOB has reduced the NASA FY-70 expenditures by \$50M, from a level of \$3.897M to \$3.847M, in addition to the manpower reduction.

NASA FY-71 BUDGET AUTHORITY TARGET - MSF has received a memorandum from the BOB, dated July 28, 1969, which gives the budget authority guidelines for the preparation of the NASA FY-71 Budget. The planning figures received are based on the BOB preliminary review of the fiscal and budgetary outlook for FY-71. The official target, as stated in the guidelines, is the maximum amount that would be available for NASA under the current fiscal outlook for FY-71. The alternative target is provided as a means of indicating priorities at a higher resource level, in case subsequent events (e.g., recommendations of Space Task Group) enables changes in current plans. The FY-71 planning guidelines are as follows:

	<u>Official Target 1/</u> (Budget Authority)	<u>Alternative 2/</u> (Budget Authority)
FY-71 NASA Budget	\$3.470B	\$4.500B

- 1/ Assume budget authority of \$3.5B per year for the 1972-1978 period.
- 2/ Assume budget authority gradually increasing in following years to \$6B in 1978.

NOTE: This compares to a \$3.716 budget authority in FY-70. (Current Nixon Budget)

ADP MANAGEMENT - Messrs. Constantino and Tuey of MSF were at MSFC August 15 pursuing the development of Manned Space Flight Data Processing System (MSF-DPS), a management information software system developed by GE, Daytona over the last two years. It is designed for Headquarters' use but will have application at MSFC and other Centers when operational. The following decisions were made in a meeting with Messrs. Constantino and Tuey to satisfy their request for the Pilot application with MSFC: (1) Headquarters will fund MSFC another \$25,000 making a total of \$90,000 for FY 70 funding for program conversion to the 1108 EXEC VIII, (2) since the ADP Decision Group will not allow MSF-DPS on our 1108 EXEC VIII at this time, due to the heavy workload, the possibility of using Slidell's computer will be investigated and a plan presented to the ADP Decision Group in September, (3) Comp Lab will ship a remote terminal to Headquarters, as requested for their development application, but it will not be connected to the MSFC EXEC VIII and Headquarters must pay the rental.

B₂/22

1. AERODYNAMIC TESTING OF MSC SHUTTLE CONCEPT: Following your conversation with Max Faget and your subsequent message to Dr. Weidner, MSC and MSFC technical people have discussed the possibility of our providing assistance in the subject matter. The results are: Wind tunnel test preparations for the separated entry body and boost element of the MSC Shuttle concept are well along at Ames and Langley. However, for the launch configuration, i.e., the combined boost and orbit elements, no wind tunnel tests have as yet been scheduled. Even though such data are not deemed to be "feasibility critical," MSC would like to show that the combined configuration has passable aerodynamic characteristics in case of abort at speeds and altitudes where separation of booster and orbiter would be a problem. For this work, 80 hours of test time in our Trisonic Tunnel have been tentatively planned for MSC in October which we expect to be able to cover with overtime work. We have already scheduled more than 260 hours of test time for various other Shuttle configurations (Lockheed's entry body and two-stage launch vehicle, GDC's Triamese entry body and two versions of their two-stage launch configurations). It is not yet determined if MSC will seek our assistance in model fabrication. Up to this point, it appears that we can help without seriously compromising our own Shuttle efforts (in terms of manpower and resources limitations). ✓

2. SATURN V COST REDUCTION: Our work on the implications of certain hardware deletions of the S-IC and S-II stages on the separation mechanics has been reported to your earlier (NOTES 8/4/69 GEISSLER, copy attached). Meanwhile, S-II ullage motor deletion was decided on by the change board to become effective on AS-509. Additional deletion of four of the S-IC retro motors is being discussed; further stage separation analyses have been performed by Boeing for us which show that removal of the S-II ullage system and four S-IC retros is feasible without endangering separation, provided a one second delay is added in the staging sequence to allow fuel decay of the F-1 engines. The gravity losses due to a one second increase in coast time result in a payload loss of about 150 kg, which is offset by a 150 kg payload gain due to weight reduction from the removal of the four retros. Accordingly, we would recommend the removal of four S-IC retro motors in addition to the ullage motors as a feasible cost reduction. ✓

Bj22

1. Elimination of Static Firing: In a letter from R. O. Middleton to Lee James, KSC expressed concern over Marshall's decision to eliminate static firing of Saturn launch vehicle stages after 515. The Safety Advisory Panel will be at KSC ~~on August 26~~ ^{on Sept. 26}, and this is one subject KSC feels would have to be discussed with the Panel. KSC requested that MSFC brief their key officials on the rationale leading to the decision to eliminate static firing. This will be done on Thursday, August 21, at KSC. In addition, we will discuss with KSC the additional testing requirements that static firing elimination will place upon KSC operations. We will keep your office posted on this in subsequent notes. ✓
2. S-IVB-510 Static Firing: The S-IVB-510 stage was successfully static fired for a full duration of 445 seconds on August 14, 1969. Prior to the static firing, the O₂/H₂ burner system was successfully fired. ✓
3. Increased Payload Capability: A presentation was given to Mr. Stoney and Bellcomm at Washington on August 12 which consisted of a status report on the methods being considered to obtain a 106,000 pounds payload capability for Saturn V 511 - 515. Headquarters was in general agreement with the approach taken. A final decision on the increased payload requirements will be made in the September or October MCM. Going to 106,000 does not require any hardware modifications. ✓
4. McDonnell Douglas Indirect Cost Control: NASA Headquarters has formed a team (including MSFC Program Management Office personnel) to review the reasons for skyrocketing indirect costs and to attempt implementation of an indirect cost control system at MDAC. The team will assemble at Huntington Beach on August 18, 1969. ✓
5. Changes in Key NR Personnel: Bob Greer is leaving the S-II Program Manager's position to head up the NR Space Station study effort. Mr. Hal Raiklen will replace Mr. Greer. Although we regret losing Bob, he has built up a strong management team, and we are glad to see Hal Raiklen get the assignment. Mr. Don Roelands is being reassigned from Director of S-II Reliability to NR Safety Director. Mr. V. P. Ostrander will replace Mr. Roelands. Mr. Paul Wickham, who was the former NR Safety Director, is assuming a new position as Chief Engineer on Space Division advanced programs. In a similar change in the Apollo organization, the CSM and AAP groups are being combined and headed by Mr. G. W. Jeffs. Mr. Dale Myers is being re-assigned to direct a shuttle vehicle study which NR is undertaking at this time on their own initiative. ✓

NOTES 8-18-69 GOERNER

B 8/22

NOTHING OF SIGNIFICANCE TO REPORT.

B2/22

NOTES 8-18-69 GRAU

No submission this week.

B8/22

NOTES 8/18/69 HAEUSSERMANN

Based on a strength of 154 personnel, the following is a status of buildup in CSE as of this date:

Permanently Assigned	48
Detailed	74
Temporary and YOC	3
Announcements Outstanding (within S&E)	12
Uncommitted	17

Since your June 4 visit to CSE we have been able to fill only nine spaces. Much will depend upon our success in filling the vacant 29 positions through the announcement procedure, which is a very time-consuming process. ✓

Jay Foster

Please explore whether it is
advisable to expedite this CSE
staffing procedure B

1. LUNAR ROVING VEHICLE (LRV): A meeting was held at MSC on August 7 and 8. Basic topic was Marshall-MS interface, concerning weights, configuration, and astronaut activities. The requirement for both astronauts to face forward was strongly questioned and no one claimed to be the author of this request. MSC denied that it was even desirable. Previously, an amendment to the work statement had been formally issued requiring provisions for both astronauts to face forward but at this meeting it was rescinded. Another meeting was held at MSC on August 13 concerning a lunar scooter. Apparently, the astronauts have great concern of wandering too far from the LEM because major psychological insecurities exist due primarily to visual distortion. Goodyear representatives were present and MSC gave criteria for a lunar rubber tire as follows: A total excursion of 8 kilometers, payload of one astronaut plus 30 lbs of science, maximum speed of 5 mph, wheel diameters of 25 inches and 6 inches wide, total scooter weight of 100 lbs; 40 on front wheels and 60 on rear wheels, temperature excursion of -50 to 275°F. It was apparent that MSC is working with a different (less stringent) set of criteria than we use in our LRV activities. They use -50°F as the lower limit for example. We know of no rubber or rubber derivative which can be used for tires at -250°F (the figure we have been using). Evidently, the MSC criteria fit nicely with the MSC "scooter" concept. ✓
2. DRY WORKSHOP: As a result of a recent visit to Huntington Beach by members of the MSC Medical Directorate, there is a good probability of renewed "interest" in the flammability, toxicity and odor aspects of the dry workshop on the part of MSC in general. Judging by the questions asked at MDAC, we can expect close scrutiny on these three items in the near future. In anticipation of this, we have begun a reassessment of our own position and will be prepared to answer their questions. ✓
3. APOLLO FECAL COLLECTION EXPERIMENT: A meeting was held with MSC personnel on August 5 to discuss the experiment's interface with the spacecraft. In general, MSC personnel were enthusiastic about the experiment, and they felt the experiment had a good chance of flying on Apollo 14. MSC personnel felt that the experiment should be presented to the Apollo Change Control Board (i.e. Mr. George Low) for approval. We will discuss this further during our August 19 presentation to you. ✓
4. SPACE STATION: Thiokol representatives made a presentation August 7 on "Controllable Solid Propulsion Technology for Space Station Application." In pintle motors, Thiokol has permanently extinguished on command, at near sea level conditions, a single chamber pintle motor without using a purge system. Through many operating cycles, this motor was extinguished numerous times at local ambient conditions. A dual chamber motor was ignited and terminated repeatedly, demonstrating high thrust vector control and a burn time of several minutes. Fluid controlled solids, pulse, and water quench are other methods of control that are being studied. ✓

That's that? Can you send me some popp (< 2 pages)?

B

K.H.
They probably limit the excursion of the scooter expected during remaining Apollo flight (8-13) and no exposure of Ares to deep shadow areas.

B8/22

1. OPTICAL CONTAMINATION SYMPOSIUM: Last week I gave the keynote address to the three-day Optical Contamination Symposium of the Optical Society at Aspen, Colorado. About 100 people attended. In addition to strong participation by MSFC, MSC, Martin-Marietta and Ball Bros., many Headquarters people from OMSF, OSSA and OART attended. Two of the ATM PI's were active participants: Dr. Newkirk chaired a session, and Dr. Tousey gave a paper. Also former MOL contractors were represented. From the papers presented, it became quite obvious that we are confronted with a serious problem for space astronomy, earth resources and other optical programs in connection with the WS cluster or a Space Station. Several excellent papers by scientists from MSC and Bellcomm described and analyzed the occurrences on Gemini and Apollo. MSFC participated with five papers and, indirectly, with the papers of our contractors. It was quite obvious that excellent work has been done at numerous places. But the only program with a concentrated effort toward solutions to the problems is that of MSFC. ✓

The following conclusions can be drawn: (a) The WS cluster and the design of the Space Station should be cleaned up to prevent contamination as far as possible. (b) All presently planned contamination experiments should be flown on the first Dry WS as planned, such as T-025, T-027, S-073 and S-149. (c) Real time contamination monitors should be added, such as a mass spectrometer (T-030), a quartz crystal microbalance to measure the added weight, and a UV and visible light spectrometer. (d) Hopefully we can now get an SRT program going with additional funds from OART to further strengthen our inhouse capability for optical contamination studies. Items (b) and (c) are also contained in resolutions of Maury Dubin's Contamination Board which met during the symposium. ✓

NOTES 08-18-69 HOELZER

B 8/22

Negative Report.

NOTES 8/18/69 HUBER

B 8/22

1. SPACE SHUTTLE REQUIREMENTS: A study has been initiated to determine the space shuttle traffic volume to support NASA's future missions. The Integrated Plan is being used as the basic mission model. The study will include consideration of the effect of payload weight and volume. We are in close coordination with Bellcomm who is doing a similar study.

Preliminary results show the number of shuttle flights (50K payload) needed to support the Integrated Plan reaches 130 per year by the end of the next decade and over 300 per year by the mid-1980's. Two-thirds of these flights support the lunar program. With regard to type of payloads: 60% of the flights would carry LH₂; 20% would be crew flights; and, 20% cargo and equipment. ✓

2. NUCLEAR SHUTTLE: Dave Gabriel informed us that SNPO is preparing a top level program plan to respond to the Integrated Plan in the event it is implemented. He also suggested we determine the impact of orienting our current contracted studies more heavily toward the nuclear shuttle requirements. SNPO appears willing to add additional money to cover the shuttle so that the design alternatives and evolution possibilities are well understood at the end of these studies. ✓

3. MISSION MODULE COMMONALITY: Members of the Space Station Task Team and McDonnell Douglas have been briefed on Manned Mars Mission Plan and some of the latest planetary mission module designs. A documented summary was provided which contained typical designs, key criteria imposed by planetary missions and potential impacts on the space station design. This input is needed by the Space Station Task Team to assess the impact of a possible planetary mission on the current Phase B space station studies. ✓

NOTES 8/18/69 JOHNSON

B 5/22

Nothing of significance to report.

NOTES 8/18/69 MOHLERE

B 8/22

ASSISTANCE TO ALABAMA A&M. Alabama A&M University has been having some difficulty in providing adequate levels of instruction in electrical engineering, electronic engineering, data processing - to mention a few. In an effort to assist in alleviating these difficulties, we have dispatched letters to a number of former Marshall employees with appropriate backgrounds and with residence in the vicinity. Through this means it is hoped that some Marshall retirees will see an opportunity for service to the community as well as for "pin money." The addressees have been asked to contact the University directly. We will follow the results of this endeavor. ✓

1. DRY WORKSHOP INSTRUMENTATION AND COMMUNICATIONS SYSTEMS: Specific details of the systems definition and hardware approaches are being worked for the Instrumentation and Communications Systems for the Dry Workshop. The most significant areas are as follows:

a. The airlock module has baselined the use of Gemini telemetry equipment. The use of Gemini hardware for the 250-day mission period is questionable with respect to the life of the equipment. Further, piece part problems have been encountered which will have to be corrected and will be costly. One approach being considered is to utilize more recently developed hardware which would be more reliable and have a greater degree of flexibility with respect to changing requirements for experiments. Redundancy and internal mounting of this hardware has also been given some consideration. The cost impact for this total change is estimated at \$5 million. ✓

b. The airlock tape recorder is mounted internal to allow inflight replacement. The ATM recorder is mounted on the rack. Consistency would indicate the ATM recorder should also be mounted internally. Cost impact is approximately \$200,000 to determine the flammability characteristics of the ATM recorder. ✓

c. The ATM command system was made simplex on the Wet Workshop. To eliminate single point failures during the unmanned period, a redundant receiver and decoder will be added. Cost impact is estimated to be \$50,000. ✓

d. The airlock is presently baselined to carry a VHF transmitter for ranging data during rendezvous. Ground data can also provide this information. Cost for the flight system is approximately \$2,000,000. We will request an action to be taken by PM/AAP to have MSC state their official position regarding whether this flight system is absolutely necessary or just a desirable item. ✓

There are also many other lesser changes and potential changes which are being worked for the Dry Workshop I&C System. Resolution of all these items will be attempted within this month to be able to maintain the earlier schedule commitment stated by Bill Schneider. ✓

2. X-RAY OPTICS FABRICATION: The Astrionics Laboratory Optical Shop has fabricated the optics for an X-ray collimator to be used for testing the Goddard ATM telescope. The optics for the Goddard telescope were procured from Perkin Elmer. Preliminary comparisons of the resolution capability of the Perkin Elmer hardware and that fabricated here indicate that both are equivalent. Comparisons will also be made of the scattering qualities and based on these tests the principal investigator (Mr. Milligan) will decide whether or not to use the Perkin Elmer hardware or that which has been fabricated in the Astrionics Laboratory. We will further advise you of specific results and decisions concerning this activity. ✓

1. S-II Pogo Investigation: We have completed the build-up of the S-II Structural Stand for Phase II vibration test and ASTN personnel are making final instrumentation changes prior to checkout of the test hardware. The S-II center engine accumulator duct has been completed and delivered to the S-IVB test facility. ✓

2. S-II: North American Rockwell has initiated a rib stringer forming improvement program at the Los Angeles Division. The purpose of this program is to determine the optimum rib thickness to eliminate rib cracking and buckling and to facilitate forming. ✓

3. Manufacturing Engineering Support to MSC: During last week one of our engineers participated as a member of an MSC Fact Finding Team to review production of the Maurer cameras at the Maurer Camera Company, Long Island, N. Y. ✓

4. Space Manufacturing: Mr. Wuenschel and others visited LTV Aerospace Corporation, Missiles and Space Division, Dallas, Texas, on August 11 and 12 for discussions concerning space processing and manufacturing. During the visit, Mr. Wuenschel made a presentation on space manufacturing at a technical meeting sponsored by LTV. The attendees at this meeting (approximately 100) represented the aerospace, electronic, and materials processing industries, technical societies, and education institutions in the Dallas-Fort Worth area. ✓

5. Neutral Buoyancy:

Coordination meetings are continuing with Astronautics personnel to establish test schedules and to upgrade the hardware in accordance with the dry workshop concepts. The Airlock and MDA are being reinstalled in the tank. ✓

Four of our personnel are at Houston undergoing chamber training. This will give us eight qualified chamber operators and provide more flexibility to test operations. ✓

6. ATM Crew Station Review:

We are providing pressure suits and support in preparation for the August 21, 1969, ATM Crew Station Review to be held in Astronautics Lab. ✓

The hardware for installation of the Crew Station Review Mockup has been completed with the exception of some small changes and additions to the original concept. ✓

38722 ✓
NOTES 8/18/69 SPEER

1. AAP I&C Considerations: To assist in the trade study being conducted on the Instrumentation and Communication System, we invited personnel from MSC (Flight Control and Support Divisions) to a technical review held last week with representatives from CSE, ASTR, the Program Office and this office. A number of operational recommendations were established and these will be considered as part of the trade study. Originally, adapting Saturn and Gemini systems to the Wet Workshop AAP through operational work arounds was considered acceptable because of program costs and time constraints. However, with the transition to the Dry Workshop we believe some redesign of the I&C system is needed and warranted to minimize these work arounds. ✓

2. Apollo 11 Aircraft Recorded Data Quality: Representatives from DOD met with COMP, ASTR, and this office on August 20, to review the quality of the telemetry data recorded by the Apollo Range Instrumented Aircraft (ARIA) during the S-IVB second burn phase. It was confirmed that these data satisfactorily meet our required specifications and their systems do not require improvement modifications which were being considered. On AS-507 and subsequent missions, these ARIA will be the only support to record these key data since the ships (Redstone and Mercury) have been deleted from the MSFN support. ✓

NOTES 8-18-69 STAMY

B4/22

No submission this week.

B 8/22

NOTES 8-18-69 Stuhlinger

1. RESULTS FROM MARINER FLIGHTS: Dr. Robert Leighton (Cal. Tech and JPL), one of the principal scientists of the Mariner Project, gave the following brief status report on Mariner results: Mars' atmosphere consists mainly of CO₂, with traces of CO, CH₄, NH₃, H₂O, and A; the pressure is between 4 and 8 millibars; the polar caps are formed very likely of CO₂; surface temperatures range from 150 to 290 deg. K; the surface is remarkably smooth; no signs of volcanism have been found as yet. ✓

2. UNREST AMONG NASA SCIENTISTS: The unrest among scientists in NASA, widely publicized recently, seems to have three sources aside from local and temporary causes of dissatisfaction.

First, young scientists who joined NASA from an academic environment find it difficult to change from a practicing research scientist to a science administrator. Rather than settling for a desk-and-meetings career, they wish to go back to active research before it is too late. ✓

Second, many scientists are reluctant to accept the very long times involved in scientific space experiments (6 to 10 years between conceptual design and data gathering). This is not only a question of patience, graduate student support, and continuity of funding, but also one of scientific obsolescence. ✓

ES. Not so different
B
Third, there is a feeling among scientists that science, as compared to engineering and project management, is not well represented in the upper levels of NASA management. While an excellent management structure exists to handle engineering problems, a similar structure does not yet exist for scientific matters. Scientists at lower levels of management feel that they have to "go it alone", and that high level statements and decisions are often made without consideration of scientific viewpoints. They fully subscribe to the fact that the space program has several other prime objectives besides science, such as advancement of technology, national achievement, applications, earth resources, and "bringing the world closer together". However, they feel that science is still a stepchild in this family of program objectives. For example, they feel that the manned Mars project should not be considered as a "man-to-Mars or bust" project, but as "an outstanding highlight in our program to explore the solar system." ✓

✓ I believe that our Center can help alleviate the problem by giving our careful attention, and our proverbial technical excellence, to such projects as ATM, High Energy Astronomical Observatory, Large Space Telescope ("Palomar in Orbit"), and post-Mariner planetary reconnaissance. ✓

Materials and Structures

Mr. C. E. Cataldo

Propulsion

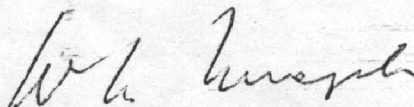
Mr. J. Thomson

(Chairman of this committee)

Chairman of the Aerothermodynamics Committee is Mr. Love, LaRC, who is a very strong man. Thermal Protection Committee, Materials, and Structures are also headed by LaRC people. In these latter areas we seem to have no problems. Chairmanship of the electronics group was not officially established. We would have had a good chance with Bill Horton who, unfortunately, at the critical time was injured in an automobile accident and is now trying to phase himself into these activities. Propulsion is headed by our Jerry Thomson and is in good condition. ✓

I, personally, am on Tischler's Steering Committee and try to influence, wherever I can, towards our participation in areas where we can contribute. ✓

It is only in the aerodynamics area that I feel we have some difficulties. Gene Love is presently concentrating on the LaRC and MSC configuration and many other requirements are being postponed. In the last MCM you saw the program plan he has developed. We need to be more insistent that consideration be given in areas Mr. Love is presently not planning. The personal effort of Dr. Geissler in support of Mr. Dahm will break the ice there, I hope. ✓



W. A. Mrazek

1 Enc:

Copy of Johnson NOTES, 8/25/69

cc:

PD-DIR, Dr. Lucas/Mr. Murphy

S&E-DIR, Dr. Weidner

S&E-R-DIR, Dr. Johnson

B 8/27

9/3/25

OMSF Advance System (Supporting) Development Program -

(1) Quarterly Review - The 1st Quarter Review of status of the OMSF FY-70 Advanced System Development Program was held at MSFC on 21 August. Representatives from KSC, MSC, the Air Force, and all major elements of Headquarters attended. Most of the speakers were from MSC and MSFC and the presentations were primarily on technical scope of the work planned to date. In general, the questions, comments and discussions tended to support task choices already made by the Centers. The only area of major concern was the lack of adequate funding to get a good start on basic data required for both the Space Station and Space Shuttle.

(2) The Tischler assignment needs some clarification. As you are aware from his presentations to the Management Council, he is supported by "Technology Committees" which are to identify the most critical requirements of the Shuttle. It may not be quite so evident, but there are indications that the committees are taking on in some areas of technology the aspects of super government; i. e., a governing body outside of and above the normal program control chain of command. As a consequence, decisions on the programs to be pursued in propulsion, materials research, structures, thermal protection and aero-thermodynamics are being delayed pending reviews (and approvals) by the technology committees. It is also assumed in some quarters that the committees will be continuing bodies to assess progress and effect program content modifications. Unless money in amounts several times larger than that currently in the OMSF advanced system development program and applicable OART programs is made available as a dedicated resource for the Shuttle, it is quite probable that the principal effect of the committees will be to delay further the work of acquiring needed data and technical information to the extent current funding will permit. Actions by the committees to date have been primarily to define programs far larger in size than there is money to support.

We are preparing some notes which may be of use to you in the up-coming Management Council Meeting. ✓

Billy W. Webb

Your comment is requested

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B 8/27

All activities during the past week have been directly or indirectly related to the devastation caused by Hurricane "Camille".

Following is a synopsis of the hurricane's effects on MTF:

- A. Overall MTF damage assessment: Moderate
- B. Damage cost estimate: Minimum of \$700,000.00, with possible \$300,000.00 to \$500,000.00 adder as systems are reenergized and reactivated.
- C. Known losses to MTF employees as of this morning, 8/25/69:

	NASA	OTHERS	TOTAL
Employee fatalities	0	3	3
Employee family fatalities	1	5	6
Employee injuries	0	3	3
Employee family injuries	0	0	0
Employees with total loss of housing and contents	13	141	154
Employees with extensive loss to housing and contents	11	162	173
Unaccounted for	0	3	3
Total Personnel Strength	78	2251	2329

(Does not include 336 GE subcontractor personnel)

- D. Damage to stage hardware: No known damage to S-IC-12 or S-II-10; slight damage to sidewall insulation of S-II-9 (Separate detailed report of results of stage inspection will be furnished when complete)

Since 10:30 a.m., 8/18/69, MTF has been functioning in 4 major categories of activities: Community Support; Refugee Accomodation; Employee Assistance; and Site Restoration. With the support of MSFC, Huntsville, MAF, MTF provided a preponderant part of the initial organization, management, communication, labor, and supplies for the ravaged areas of Long Beach, Pass Christian, Hancock County, and Pearl River County. Approx. 1300 refugees were accomodated at MTF on the night of the hurricane. This number decreased gradually during the week, and practically all refugees had departed as of late Sunday, 8/24/69. Prime consideration has been given to the plight of MTF employees, and various types of assistance have been rendered. Temporary housing has been obtained by practically all employees. Repair to site facilities has been limited this past week to that required to prevent further deterioration and that required to carry on activities required by emergencies resulting from the hurricane such as the restoration of electrical power, etc.

A "Camille" Recovery Task Force, consisting of all Government and contractor top managers at MTF, plus the manager of MTF, was formed on Wednesday, 8/20/69, to provide for the expeditious accomplishment of the 4 categories of activity mentioned above. The response of contractor management and individual employees has been outstanding.

As local, state, and federal authorities are able to assume responsibility and control of the functions we assumed initially, MTF is phasing out its community support activities. We intend to continue, with the full recognition of the Office of Emergency Preparedness, to support federal and local agencies in specific areas where their capabilities are still deficient.

Despite the lack of a full complement of personnel because of necessary absence of some employees because of personal problems from the hurricane and the continued limited support to communities, we are attempting to man all functional activities, beginning today, in order to restore normal discipline and operational capability at MTF.

NOTES 8-25-69 BECKER

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8/25

MSFC ROLE IN LUNAR MOBILITY HARDWARE: During Dr. Naugle's visit to MSFC on 8-21-69, Capt. Lee Scherer indicated a desire to assign the definition and development of other lunar mobility hardware to MSFC. This approach is consistent with previous indications that MSC is not actively pursuing mobility hardware such as the lunar flying vehicle and the lunar ground effects machine in view of their other work on space stations, etc. ✓

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NOTES 8/25/69 BELEW

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ATM EVA CREW STATION REVIEW (CSR): The ATM EVA CSR was held in the Astronautics Lab on August 20-21, 1969. Astronaut Rusty Schweickart was the principal subject who performed the EVA camera translation tasks in the shirtsleeve mode. The basic concepts used were in the wet workshop configuration. Dry Workshop EVA concepts were also reviewed.

Several crewmen and film translation concepts are presently under study. The Airlock Module (AM) EVA hatch and the ATM workstations are not aligned in the baselined configuration. It is very desirable to have them aligned so that the crewmen can see each other at all times, plus it simplifies the translation of the crewmen and cameras. To do this, it will be necessary to rotate the AM approximately 50 degrees. Our contractor and labs are studying the impact at this time. ✓

The volume in the AM between the hatches is very marginal for two crewmen and cameras. To alleviate the problem, the aft section of the AM would have to be used for camera storage. The impact of moving the AM hatch aft or closing the S-IVB LH₂ tank hatch is being studied by our contractor and labs with an interim report due 9/4/69. ✓

TRANSFER OF ACE STATION: The decision was made by Mr. Wm. Schneider to use Grumman ACE Station #3 at MSFC to checkout the ATM. This decision will require upgrading of the station by modification and documentation. ✓

ATM CONTROLS & DISPLAYS (C&D) MOCKUP: The Bendix Co. demonstrated a hi-fidelity ATM C&D functional mockup on August 21, here at Marshall. We understand the unit will remain at Astrionics Lab through next week and may be demonstrated to you during a planned tour of the lab next Tuesday. ✓

ATM STATUS REVIEW: An ATM In-house Status Review is scheduled for August 26-27. The meeting is intended to be similar to the ones previously conducted on a monthly basis; however, this review will also encompass the design changes and impacts associated with the dry workshop configuration. The meeting will be the basis for more detailed efforts to take place during the next three weeks. ✓

NOTES 8/25/69 BETHAY

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SPACE PROGRAM BENEFITS - We have alerted by Ray Thompson in Capt. Freitag's Office that MSFC may be called on to coordinate an overall MSF effort to develop lay-language descriptions of benefits accruing to the man-in-the street from the space program. Although details of the approach for this effort have not been completed, present thinking is to focus on lay-language descriptions of experiments planned in AAP, activities in the Shuttle and Space Station development, and planetary missions to better describe for the man-in-the street what the event is; what happens; what we will learn from it; and how the average American will benefit. This is essentially the same format we developed the same in a previous response to Freitag's Office for similar data on MSFC experiments in AAP. ✓

DISCUSSION REGARDING NASA OVERSIGHT SUBCOMMITTEE STAFF STUDY

Jim Wilson of the House Space Committee Staff has recently discussed with MSF personnel possible subjects for the usual fall Oversight Subcommittee Staff Study. Suggested subjects include an extension of last October's Wilson/Gould staff study of Apollo Program Management, and an overall Apollo Cost Study. Should the study of Apollo costs be selected, it would be undertaken with the expectation that it would demonstrate the effectiveness of NASA Management in controlling cost, holding down overruns and overcoming other problems of the type that have been brought to light regarding DOD programs during the past year. Final decision on the subject and dates will not be made until the second week of September. ✓

R&PM POP 69-3 - A request has been received from Headquarters for Program Operating Plan POP 69-3. The request provided a maximum resources availability in FY 1970 (including the pay raise cost of \$7,363,000) of \$118,486,000. This is \$378,000 less than earlier guidance from Headquarters (\$118,864,000). It is approximately \$1M below the Center's Congressional Budget Submission and represents MSFC's share of the \$7.1M cut by the House Authorization Bill. This compounds MSFC funding problems since ^{our} ~~our~~ estimated requirements exceed fund availability by \$2.5 million. A reassessment of our situation is in process. ✓

B 8/27

9/8/25
General - A preliminary investigation of the engine hardware at MAF and MTF revealed no apparent damage due to Hurricane Camille. The only known loss occurred at MTF when the doors were blown away from the building which stores the engine support hardware. No damage was suffered by the stored hardware other than minor wetting from the rain and removal of identification labels by the wind. All Engine personnel at both MAF and MTF have been accounted for. ✓

F-1 Engine - A crack developed in the sequence valve to sequence valve control line on F-1 R&D engine 111-3, at Edwards Field Laboratory. The line had less than 300 seconds of hot-fire time. Initial investigation indicated a possible weld inclusion adjacent to the machined sleeve fillet weld on the main LOX valve inlet port. Subsequent investigation indicates a fatigue type failure. A replacement line with strain gauges attached indicates high vibration and stress loads in the suspected area. An EFIR has been issued to X-ray a limited number of engines in the field. Effectivity of the EFIR may be expanded to include all F-1 engines in the field. ✓

Preservation of Rocketdyne Manufacturing and Test Capability - For some time, we have been discussing with Rocketdyne ways and means of maintaining their manufacturing and test capability during the hiatus following SA-515. Planning has been based on a 3 x 0 launch schedule starting in the 1973 time frame. With engine manufacturing and testing being completed on the present Apollo schedule about the first of calendar year 1970, a three-year gap will ensue during which time some steps must be taken to maintain the manufacturing equipment and test facilities in condition for future use. Rocketdyne has submitted a proposal for the preservation and maintenance of the basic tooling and test facilities totaling \$384,753 for initial preservation and \$614,251 for annual maintenance. If the low cost engine buy of 30 F-1's and 36 J-2's gets underway as scheduled around the first of calendar year 1970, a reduction in cost to \$195,500 for initial preservation and \$418,000 for annual maintenance is estimated. ✓

We have talked with Roy Bullock and General Curtin at NASA Headquarters to enlist their aid in funding this effort on the basis of Rocketdyne's capability being a national asset to the space program. We were informed that Headquarters can give us no assistance through the facilities channel. The preservation and maintenance item has not been budgeted in engine program funds. We are coordinating this activity with Art Daly and the Program Development directorate. This same situation exists for the other program offices, and estimated costs for their facilities, including MTF and Michoud, indicate that MSFC may be faced with a potential \$8-10 million problem. ✓

B 8/27

NOTES - 8-25-69 - DOWNEY

9/8/25

1. HIGH ENERGY ASTRONOMY OBSERVATORY: Mr. Halpern, the OSSA Program Manager for HEAO, remained at MSFC after Dr. Naugle's visit to discuss planning for Phases B, C, and D of the first HEAO mission. Mr. Mitchell told me that he was very pleased with our presentations in the astronomy area. ✓
2. GULF STREAM DRIFT MISSION: Mr. May returned to MSFC on August 22. He will be working closely with the Space Station Task Team in relating the experiences and knowledge which he obtained during the mission. Also, Mr. May will be preparing a presentation to describe the mission, his observations, general results, etc. ✓

NOTES 8/25/69 GEISSLER

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1. AS-507 APS FAILURE CONTINGENCY: We have been asked by the Mission Operations Office to check out a proposed new flight mission rule concerning contingency action following the failure of one APS module on the S-IVB during earth orbit (TB5), TLI preparation (TB6 prior to restart), and translunar coast (TB7). According to this ruling, the booster system engineer would - in case of loss of one APS module - inform Flight and command "S-IVB Burn Mode A and B on," as a result of which the APS pitch and yaw control commands will be sent to the J-2 engine gimbal system instead. During coast periods, the crew would then control and stabilize the vehicle in pitch and yaw attitude with CSM RCS. Pending closer study and computer simulations, which we are undertaking, we are in tentative agreement with the proposed mission rule. ✓

2. HIGH REYNOLDS NUMBER TEST EQUIPMENT: The shake-down and calibration program on this facility is well underway, approximately 130 shots having been made since April of this year. To this point, however, we are still working in the subsonic speed range (between Mach 0.25 and 0.77) and at approximately a third of full operating pressure. Calibration in the transonic range at high pressures will commence soon. During this phase, we will also be able to obtain data on the sound problem in the immediate vicinity of the HRE. ✓

3. AIAA SPECIALISTS CONFERENCE: The AIAA has given official approval for our proposed AIAA Specialists Conference on Observing and Predicting Solar Activity, to be held here on November 16-18, 1970. Conference General Chairman will be Dr. Leonard L. Devries of our Aerospace Environment Division, and the Technical Program Chairman will be Mr. Gerhard Heller. Our preliminary plans include sessions on solar observing (optical, magnetoheliograph, UV, EUV, X-ray, etc.), short- and long-range solar predictions, manned and unmanned orbiting solar observatories, geophysical responses to solar activity, and recommendations for future activities in this area. ✓

4. PRESENTATION AT IAF CONGRESS: A report on "Rapid Optimization of Multiple-burn Rocket Trajectories" describing the work done under our Optimal Guidance contract with IBM will be presented by Dr. George Johnson of that firm to the 20th Congress of the International Astronautical Federation at Mar Del Plata, Argentina, October 5-11, 1969. ✓

SATURN:

NOTES 8/25/69 GODFREY

9/8/25 GODFREY

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1. S-II-10 Stage Status: The S-II-10 was successfully cryoproof tested on Friday, August 15, 1969. The static firing of S-II-10, now scheduled for August 28, 1969, will be delayed for an indefinite period pending resumption of normal operations at MTF. The review of S-II-9 and 10 by the MTF personnel has indicated that only minor insulation damage was sustained. Based on current schedules, a reasonable delay can be tolerated. ✓

2. ST-124-M Platform Performance, AS-506: It appears that the Y-accelerometer float was driven to its stop due to liftoff acoustical vibrations, thus generating a 2-meter-per-second cross range velocity error. The effect of the error on the overall flight was insignificant; however, further analysis must be conducted to evaluate a similar exposure to the X and Z accelerometers. The steel channels flown on IU-501 through 504 were removed for structural loading reasons on IU-505 and replaced with a lead epoxy dampening compound. Our operational instrumentation is inadequate to completely evaluate the problem, so we may have to make some measuring changes on IU-507 to provide good data. ✓

3. RTG Cask Cooling System: IBM has been directed to improve the nozzle positioning design of the system to provide a positive locking device which will insure that the nozzle cannot be moved after alignment has been accomplished. The improved design is a requirement for IU-507 and subsequent. Astronautics has been asked to review the test setup used during flow testing of the RTG cask cooling system to determine if the system installed in IU-507 is comparable to the test setup. It is expected that photographs taken during the test period will provide the necessary comparison. ✓

4. LVGSE Consolidated Procurement: Our LVGSE procurement plan has been approved. However, we were requested to send a new Incentive Arrangement Plan for Headquarters' approval prior to release of the RFP. A new incentive plan has been submitted, and we anticipate approval. We feel we will be able to meet our September 1 goal for release of the RFP. ✓

LRV:

Dr. Mueller is planning a major review of LRV at the September MCM. MSC has been asked to report on lunar surface effects and LM weight problems.

We are preparing a factual presentation covering contract status, weight estimates, design objectives, and contractor proposal trending. Dry run to center management is scheduled for September 5. Significant concern has been expressed by W. E. Stoney and others at NASA Headquarters pertaining to the strength and frequency of negative LRV statements coming from MSC.

Mr. Stoney has called a meeting on Monday, August 25, of our major proposing contractors to solicit data which might strengthen the LRV position with respect to answering negative points being raised by MSC. A member of the LRV project will attend as an observer. Proposals were received from Grumman, Bendix, Chrysler and Boeing/GM on Friday, August 22, as requested. Evaluation activity officially began today at 8 a.m. ✓

B 8/27

NOTES 8-25-69 GOERNER

8/25

1. RADIATION PROTECTION REQUIREMENT: During a presentation to MSFC on 7-31-69, McDonnell Douglas Aircraft Company (MDAC) identified the radiation protection requirements imposed by the Space Station work statement (paragraph 3.3.7.5) as "unduly" restrictive. The MDAC presentation material has been reviewed, compared to an inhouse estimate and critiqued. The inhouse estimate indicates an expected depth dose of less than 15 rem/6 months for either a 250-n.-mile 55° or a 200-n.-mile 90° orbit, including one large solar flare. This is well within the work statement "allowable" dose. The MDAC dose estimates are considerably higher and are outside the "allowable." Upon examination, it appears that the MDAC estimates may have neglected certain correction factors. We have suggested that no work statement "relief" be given until these expected dose estimates are reconciled.

Mr. H. S. Manning, PD-DO-M, visited MSC August 12-13, 1969, to discuss expected doses and dose allowables. A comparison of MSFC and MSC data and methods indicated expected dose estimates within 10 to 20 percent.

2. CROSS-RANGE STUDY: A request was made via TWX from Mr. L. Day, Manager of the Space Shuttle Task Group, as a result of an action item made by Dr. Mueller at the executive session of the MSFC Management Council on 8-6-69, for a study to determine the cross-range capability and the effect on lift-off weight of the proposed contractor configurations of reusable launch vehicles, considering plane change, hypersonic cruise and subsonic cruise. Studies have been initiated by our Performance and Flight Mechanics Division to determine performance trade-offs related to achieving cross-range requirements using these methods separately or in conjunction. It is too early to give even preliminary results. The study is progressing adequately and results should be forthcoming well before the 9-9-69 deadline.

NOTES 8-25-69 GRAU

B 8/27

No submission this week.

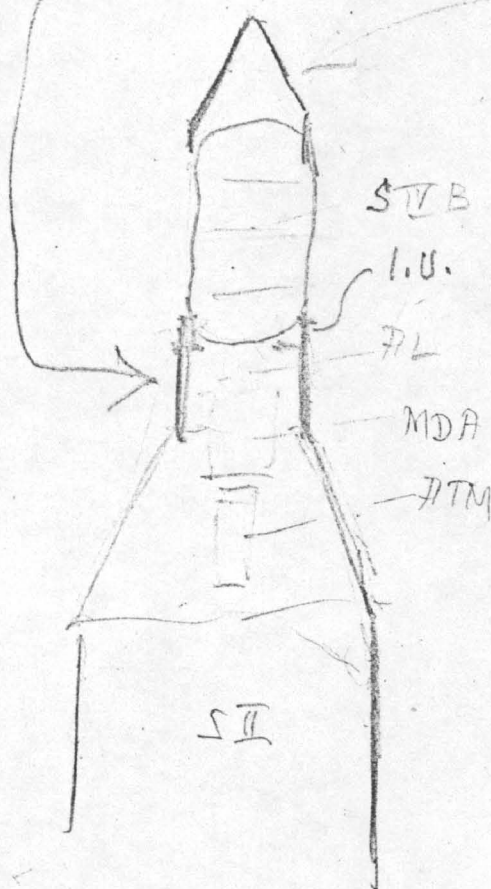
NOTES 8/19/69

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An intensive two week Saturn V Workshop (SVWS) configuration trade study was completed this week by CSE and the design laboratories. Its purpose was to evaluate the desirability of making a change in the payload orientation of the SVWS relative to the launch vehicle in order to relieve interference problems with the Mobile Service Structure (MSS) and to allow launching the ATM in the orientation for which it was designed. (The alternate configuration is the same in orbit but the orbital assembly is launched in an inverted position relative to the launch vehicle; that is, the workshop is forward with a nose cone added for aerodynamics and with a cylindrical shroud covering the MDA, AM and ATM). A review of the requirements for the MSS indicates that it probably will not be required. It was agreed in a meeting of the involved laboratories that the remaining considerations did not show sufficient advantage to justify recommending a change to the configuration which was put under configuration control recently. As a courtesy, Bill Schneider was briefed on the status of this study during his review of the ATM although the evaluation had not been completed at that time.

W.H.is this what you mean?
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B 8/27

26/8/25

1. LUNAR ROVING VEHICLE: A weight allocation study has been initiated from a cursory allocation of weights; a 400 pound vehicle appears feasible. Two conceptual designs were investigated for astronaut side-by-side seating. Both are undesirable because the side-by-side seating complicates stowage, weight distribution and vehicle stability. ✓
2. ASSISTANCE TO ARMY LANCE PROGRAM: A few years ago General Eifler discussed with you some support from us on the Lance program. As you may recall, we succeeded in helping the Army overcome their problem at that time. Recently, we have been contacted again concerning new problems on the Lance. We are being pressed to again participate in helping find a solution to their problems, which appear to be caused by combustion instability coupled with an adhesion problem between the ablative thrust chamber liner and the steel housing. As best we can on a consulting basis, we are participating. ✓
3. BIOASTRONAUTICS: We successfully delivered an operating prototype ergometer to MSC on Monday of last week. This delivery established some sort of precedent in that the PDR has not yet been held on this piece of apparatus. But because of the exceptionally close and excellent working relationship with the principal investigator and our other MSC counterparts, hardware very close to the final flight configuration has been delivered, operated and very favorably commented on by the MSC recipients. According to MSC, something like this has never happened before. ✓
4. ILRV BASE HEATING STUDY (AEROSPIKE ENGINE): Considering the Aerospike Engine as a contender for the Integrated Launch and Reentry Vehicle, brought up the problem of plume impingement on one of the aerodynamic control surfaces starting at approximately 70,000 ft altitude. The resultant heating and pressure loads have been studied with the conclusion that these will be less than those experienced during reentry. Therefore, this problem should not preclude the consideration of the aerospike engine. ✓
5. FIRE RESEARCH PROGRAM: Mr. Key of our Materials Division attended a NASA Fire Research Program meeting at Electronics Research Center. As a result, we believe some effort in the area of evaluation of warning systems is in order. In addition we are cooperating with the U.S. Coast Guard in their planned fire detection and suppressive studies which are to be carried out aboard a large freighter which is (was?) anchored in Mobile Bay. ✓
6. ATM ECS SEPARABLE CONNECTORS: A long duration test for leakage and corrosion is being performed in-house on the subject high compression O-ring connectors. The connectors are in a vacuum and pressurized to 50 psi with methanol-water. After 6 weeks duration, no leakage occurred. The test will continue for another month; the connector will then be checked for leakage and material corrosions. ✓

NOTES 8-25-69 Heller

9/2/25

B 8/27

Negative report.

NOTES 08-25-69 HOELZER

2/8/25

B 8/27

Negative Report

NOTES 8/25/69 HUBER

JF 8/25

B 8/27

1. FUTURE PROJECTS FILM: Work has been in progress for some time to produce a movie on MSF future projects, under Capt. Freitag's direction. Georg von Tiesenhausen of my office is working with Headquarters and the company producing the film (AV Corporation, in Houston). Completion of the film was originally scheduled for early August; however, a decision in late June to shift emphasis from how to why of space programs resulted in a few weeks' delay. ✓

Capt. Freitag has recently decided to delay completion of the script until late September. The intent of this delay is to allow later information on future program planning to be incorporated into the film. We will keep you posted on later developments. ✓

2. NUCLEAR ENGINE TEST: The nuclear XE engine is scheduled to be tested for the last time on August 28 at the Nuclear Rocket Development Station, Jackass Flats, Nevada. This test will be a startup test to low power. The XE test series was initiated in December 1968 with a total of eight tests being performed. No more nuclear engine tests are scheduled until approximately 1974, when the first NERVA flight engine development test is scheduled. Reactor tests will continue during this period. ✓

NOTES 8-25-69 HUETER

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B 8/27

No submission this week.

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OMSF Advance System (Supporting) Development Program -

(1) Quarterly Review - The 1st Quarter Review of status of the OMSF FY-70 Advanced System Development Program was held at MSFC on 21 August. Representatives from KSC, MSC, the Air Force, and all major elements of Headquarters attended. Most of the speakers were from MSC and MSFC and the presentations were primarily on technical scope of the work planned to date. In general, the questions, comments and discussions tended to support task choices already made by the Centers. The only area of major concern was the lack of adequate funding to get a good start on basic data required for both the Space Station and Space Shuttle.

(2) The Tischler assignment needs some clarification. As you are aware from his presentations to the Management Council, he is supported by "Technology Committees" which are to identify the most critical requirements of the Shuttle. It may not be quite so evident, but there are indications that the committees are taking on in some areas of technology the aspects of super government; i. e., a governing body outside of and above the normal program control chain of command. As a consequence, decisions on the programs to be pursued in propulsion, materials research, structures, thermal protection and aero-thermodynamics are being delayed pending reviews (and approvals) by the technology committees. It is also assumed in some quarters that the committees will be continuing bodies to assess progress and effect program content modifications. Unless money in amounts several times larger than that currently in the OMSF advanced system development program and applicable OART programs is made available as a dedicated resource for the Shuttle, it is quite probable that the principal effect of the committees will be to delay further the work of acquiring needed data and technical information to the extent current funding will permit. Actions by the committees to date have been primarily to define programs far larger in size than there is money to support.

We are preparing some notes which may be of use to you in the up-coming Management Council Meeting.

Billy Mirazek

Your comment is requested

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NOTES 8/25/69 MOHLERE

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UNIVERSITY OF TENNESSEE SPACE INSTITUTE RELATIONSHIPS: As a result of a visit on August 6 by myself, accompanied by Messrs. Miller, Parks, and Kent, Dr. B. H. Goethert, Director of the Space Institute, has expressed a strong interest in developing an active program of interaction with the MSFC. In particular, he is anxious to work toward achieving the following: a) development of short courses to meet MSFC work requirements; b) participation of our employees as part-time UTSI professors, or visiting lecturers; c) initiating a "pilot" course in connection with our refresher training activities; d) developing joint research projects on problems of mutual interest; e) initiating a graduate co-op program; and f) establishing a consulting arrangement wherein one of the UTSI faculty might spend one day a week at the Center working in one of the laboratories and presenting regular lectures on a subject of joint interest. The implementation of these suggested activities would result in a meaningful and mutually beneficial relationship between MSFC and UTSI at a relatively small outlay of funds. I will pursue this approach with affected MSFC organizations. ✓

NASA-ASEE ENGINEERING SYSTEMS DESIGN PROGRAM: The 1969 NASA-ASEE Engineering Systems Design Program conducted by Auburn University concluded with a presentation by the participants on Thursday, August 20, in the Morris Auditorium. The presentation was favorably received by a large audience. ✓

AUBURN'S GRADUATE PROGRAM: We have learned that MICOM and Auburn University are exploring the feasibility of conducting a specialized program of graduate study in engineering for MICOM. MSFC is also working closely with Auburn in developing a similar program in the science and management area. It would appear that a tri-partite arrangement could be beneficial to all parties concerned. ✓

AUBURN UNIVERSITY RECIPROCAL AGREEMENT: Auburn University signed a reciprocal (or cooperative) agreement with MSFC last week. We are very hopeful that this will lead to active interactions which will be mutually beneficial to MSFC and Auburn. ✓

NOTES 8/25/69 MOORE

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1. DRY WORKSHOP LAUNCH SCHEDULE: We are quite concerned about the new launch readiness of March 1972 which Mr. Schneider has recently established. Whereas this results in some elements of the Dry Workshop having a relaxed schedule compared to the Wet Workshop, the ATM schedule has been essentially kept the same as it previously had been. Many of the technical impacts will be in the ATM and will involve hardware for which the Astrionics Laboratory is responsible. Some of the impacts are the changes to the attitude control system (hardware and software), potentially different thermal environments for the black boxes, longer life requirements for components, and changes due to the reversed thrust acceleration on certain items, such as NRL film camera and launch locks for the gimbaled cannister. Although each of these technical problems can be resolved, the proposed launch readiness date of March 1972 is extremely tight and could become unrealistic if additional significant ATM modifications are identified. ✓

2. CMG-ACTUATOR STATUS: CMG-actuator pivot tests using dry lubricant were halted after 60 days of thermal-vacuum testing. The gears withstood the test; however, the condition of the gears is such that we cannot, with confidence, recommend the dry lube system for use in the 300-day Dry Workshop mission. We have, therefore, developed and will propose a program incorporating wet lubrication aimed at the new 300-day requirement. ✓

NOTES 8-25-69 SIEBEL

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No significant items to report.

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1. Apollo 11 Early Apollo Scientific Experiment Package (EASEP)

Operation: The EASEP Passive Seismic Experiment Package (PSEP) transmitter was reactivated by ground command on August 19 and an analysis of the systems revealed it had survived the lunar night. After 15 minutes, the experiment package itself was turned on and it appeared that a 3 KHZ oscillator was not working, thereby causing the Long Period Seismic Channels, the Long Period Calibration pulse and the Experimental Package auto heater to be inoperative. It was anticipated that increasing temperatures would cause the oscillator to function after a warmup period. About five hours after the package was turned on, commands were sent in an attempt to start the system with no results. However, the unit started to operate nominally 1-1/2 hours later. At last report the systems were functioning properly and the temperatures are approximately 6°F less than those of the last lunar day for the same sun angle values. On August 22 the average internal temperature was 177°F. Minor seismic activity has occurred frequently since the unit was turned on. ✓

2. Launch Wind Data Requirements: In a meeting on August 22 among S&E-AERO, ASTN, COMP, and this office, the meteorological Jimsphere Balloon Releases required in support of the Saturn V launches were assessed. The required releases were reduced by approximately half to five basic releases which provide adequate support for the AS-507 and subsequent launches. Contingency balloon releases are planned for marginal wind or extended hold conditions from L/V cryogenic loading through launch. ✓

3. Data Relay Satellite: As of last week, General Stevenson was still pushing the use of Intelsat IV on AAP as an operational test in accordance with our recommendation. A letter was written for Dr. Mueller's signature authorizing hardware funds to be provided from the mission operations budget. However, GSFC is now revising their cost figures downward on the original Data Relay Satellite System (DRSS), and at the same time OSSA is saying that they need the DRSS for their missions. Simultaneously, a move is also on to remove only one of the MSFN sites in place of the three originally planned. We will evaluate the alternatives if and when they are officially presented. ✓

4. AS-506/S-IC Entry: Reference notes Speer 8/11/69. Col. Schulherr, Mission Operations, Headquarters, has informed us that he received the S-IC piece from Apollo 11 which struck the German ship Vegesack. The piece is about 30 cm and is T-shaped. Schulherr is bringing the piece to MSFC on Wednesday. He has prepared a letter to the ship Captain (to be signed by you) and has coordinated it with the State Department. On future launches, ETR will broadcast on maritime frequencies the time of impending launch starting at T-3 days instead of the previous 90 minutes. ✓

→ I didn't, in order to avoid unwanted publicity about "having hit a ship"
B

NOTES 8/25/69 STAMY

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STATUS REPORT - HURRICANE CAMILLE

Damage to Michoud Assembly Facility as a result of Hurricane Camille is considered minimal.

All personnel assigned to Michoud Assembly Facility have been accounted for; however, extensive property damage has been suffered as follows: NASA - four families plus the parents of one employee; CCSD - fourteen families; Mason-Rust - four families; LTV - six families. The personnel of Rocketdyne and Bell Aerosystems apparently suffered no property damage as none was reported. The status of Boeing personnel and property damage they may have suffered is being reported through MTF.

MAF efforts for hurricane relief included janitorial and civil defense supplies and equipment; medical personnel, supplies, equipment and aid; teams of personnel to assist in the relief effort operated through the Control Center at MTF; provided transportation for MSFC personnel to MTF Control Center and disaster area; utilization of MAF port facilities to assist New Orleans sponsored relief efforts to load supplies to be transported via civilian barges to the disaster area. Boeing has set up a relief center in Building 350 to assist hurricane victims; contributions from all MAF personnel, NASA and contractor, are delivered to this area for distribution. A Red Cross relief center has also been established in Building 350 to aid hurricane victims. ✓

Jim S.

MAF did a superb job in responding promptly to the needs in the disaster area.

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9/3/25
1. DR. NAUGLE'S VISIT: From many remarks, I received the impression that our OSSA guests were fully satisfied with the result of our presentations and discussions on 8/21. ✓ They have confidence that a stable situation exists with respect to some projects (HEAO; Experiment Module), and that a clarification of MSFC's part in other projects (planetary exploration, large stellar telescope) will be obtained in due time. ✓

2. ASTRONOMY MISSIONS BOARD (AMB): The AMB has written a draft of a Position Paper. The final paper will be submitted to NASA as part of the FY 71 budget planning cycle.

The unique contribution of space astronomy to our scientific knowledge can best be appreciated from a survey of the great problems in modern astronomy as cited in the Position Paper:

- a. The puzzling phenomenon of quasi-stellar objects (Quasars).
- b. The violent explosive events in the nuclei of galaxies. Do they lead to quasars?
- c. The strange phenomenon of the 2 million degree K temperature in the solar corona, surrounding a cool (6000° K) solar surface.
- d. The possible formation of planetary systems observed in the dust clouds around certain stars.
- e. The mysterious pulsars, which may be fast-rotating, small, and heavy neutron stars (density $\approx 10^{12}$ g cm $^{-3}$; magnetic field $\approx 10^{12}$ Gauss; rotational speed ≈ 1 to 100 revol. per second).
- f. The OH molecules in the interstellar medium at a temperature near absolute zero which emit brilliant maser beams, brighter than the radiation from any known thermal source at 10^{12} deg. K. ✓
- g. The recent discovery of organic molecules existing in cold interstellar space. Perhaps, the simplest building blocks of life did not form during geological evolution on a planet, but were created in the primordial process that formed the stars.
- h. The microwave background in the universe, corresponding to a temperature of 3° K (Planck's maximum is at about 1 mm wavelength). Strongly supporting the big bang theory, it concerns the ultimate beginning of the universe.
- i. The Crab nebula, which affords us a glimpse at the ultimate termination of the life of a star. ✓

It is most gratifying to see that this spirit of excitement and discovery is permeating the planning effort of the astronomy program. ✓